NON-PUBLIC?: N
ACCESSION #: 8803010415

LICENSEE EVENT REPORT (LER)

FACILITY NAME: Cooper Nuclear Station PAGE: 1 of 4

DOCKET NUMBER: 05000298

TITLE: Reactor Scram Due to APRM High Flux Resulting from an Equipment Problem when Restoring a Reactor Recirculation Pump to Service
EVENT DATE: 01/28/88 LER #: 88-002-00 REPORT DATE: 02/26/88

OPERATING MODE: N POWER LEVEL: 035

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR SECTION
50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:
NAME: Donald L. Reeves, Jr. TELEPHONE #: 402-825-3811

COMPONENT FAILURE DESCRIPTION:
CAUSE: B SYSTEM: AD COMPONENT: MG MANUFACTURER: G080
REPORTABLE TO NPRDS: Y

SUPPLEMENTAL REPORT EXPECTED: No

ABSTRACT: On January 28, 1988 at 7:12 P.M., a reactor scram occurred during startup of the 1B Reactor Recirculation (RR) Pump due to Average Power Range Monitor (APRM) High flux. During the pump startup sequence, the 1B Reactor Recirculation Motor Generator (RRMG) speed control system malfunctioned, resulting in a core flow increase greater than expected when the 1B Recirculation Loop Discharge Valve automatically jogged open. Consequently, reactor power increased to the APRM High flux scram setting (approximately 66 percent power) for the existing reactor flow condition. During th
ensuing
Reactor Vessel water level transient, water level decreased to the point where actuation of Groups 2, 3, and 6 Isolations occurred. Additionally, upon transfer of 4160V AC power, both Diesel Generators automatically started.

At the time of this event, the plant was in operation at approximately 35 percent power (275 MWe). The flow control system malfunction occurred as a result of a locking screw, used to secure a disc that actuates high and low travel stops, which had loosened and vibrated off. The disc dropped into the low limit switch and, due to its actuation, scoop tube drive in the lower

direction was electrically stopped. Therefore, the expected runback of the RRMG to minimum speed following pump breakaway was prevented.

A thorough inspection of both 1A and 1B RRMGs and calibration of the RRMG control loops was performed. The previously noted deficiency on the 1B RRMG was discovered and corrected. In addition, deficiencies found during calibration of the control loops were resolved. Preventive maintenance requirements will be upgraded to incorporate the lessons learned from this event.

(End of Abstract)

A. Event Description

On January 28, 1988, at 7:12 P.M., a reactor scram occurred during startup of the 1B Reactor Recirculation (RR) Pump due to Average Power Range Monitor (APRM) High flux. Earlier in the day, at 4:24 A.M., the 1B Reactor Recirculation Pump had been secured when voltage transients and speed indicator fluctuations had been experienced with the Motor Generator. The reactor scram occurred during the ensuing startup of the 1B Reactor Recirculation Motor Generator (RRMG) following maintenance activities when, during the RRMG startup sequence, the speed control system malfunctioned. This malfunction was unrelated to the electrical problems previously experienced for which corrective actions had been completed. During the startup sequence, noting that pump speed was not being controlled as expected, the Licensed Operator at the controls realized that the speed control system was malfunctioning. Action was immediately taken from the Control Room to lock the scoop tube positioner, and instructions were provided to the Licensed Operator stationed locally at the RRMG to take local manual control of the RRMG and reduce RR Pump speed. However, insufficient time existed to establish control of RRMG speed, and as the Reactor Recirculation Loop B discharge valve automatically jogged open, the resulting total reactor core flow increase was greater than normal. This caused a reactor scram at an indicated APRM level of approximately 66 percent power. Due to APRM gain adjustments which had previously been inserted while operating with only one RR Pump in service, actual reactor power would have been approximately 58 percent. During the subsequent Reactor Vessel water level transient, water level decreased to the point where Group Isolations 2, 3, and 6 (Primary Containment, Reactor Water Cleanup and Secondary Containment, including Standby Gas Treatment System initiation) occurred. Additionally, upon transfer of 416OV AC power from the normal Station Service Transformer to the Startup Station Service Transformer, both Diesel Generators automatically started, as designed.

B. Plant Status

Operating at approximately 35 percent power (275 MWe), attempting to restore the 1B Reactor Recirculation Pump to service.

C. Basis for Report

An unplanned actuation of the Reactor Protection System and subsequent actuations of Engineered Safety Features (ESF), reportable in accordance with 10CFR50.73(a)(2)(iv).

D. Cause of Event

Equipment deficiency. An investigation of the speed control problem revealed that a locking screw used to secure the disc that actuates the high and low travel stops had loosened and vibrated off. As a result, the disc dropped into the low limit switch and, due to its actuation, the

scoop tube drive was electrically stopped from moving in the lower direction. Therefore, the normally expected runback of the RRMG to minimum speed following pump breakaway was prevented.

E. Safety Significance

None. In Chapter XIV of the USAR, a core coolant flow increase, due either to startup of an idle recirculation pump or to a flow controller failure, was considered during the evaluation of abnormal operational transients. As stated in paragraph 5.1, Chapter XIV, increasing core flow reduces the void content of the moderator, resulting in a positive reactivity addition. The concern is that the resulting high power may exceed the fuel cladding safety limit (MCPR-Minimum Critical Power Ratio). Through analysis, it has been determined that other abnormal operational transients which involve more significant changes in power are more limiting vis-a-vis MCPR considerations than a core coolant flow increase. Therefore, an analysis of an increasing core flow abnormal operational transient is not presented.

In the Technical Specifications in Section 2.1, it is noted that APRM trip settings are established to prevent fuel cladding safety limits from being exceeded. As stated in Basis Section 2.1.A.1.a, during abnormal operational transients, the thermal power of the fuel will be less than that indicated by neutron flux due to the time constant of the fuel. Analyses have demonstrated that even with the scram setting

established at 120 percent of rated power, none of the abnormal operational transients analyzed will result in violating the fuel cladding safety limit (MCPR less than 1.07 for 2 loop operation; less than 1.08 for single loop operation). The CNS design incorporates the use of a flow biasing network which automatically adjusts the APRM based scram and rod block settings downward as flow is reduced, proportional to total core flow. Consequently, during conditions of reduced core flow, even further margin is provided to ensure that the safety limit is not violated. During this event which occurred at reduced core flow conditions, the power increase was terminated at a power level much less than 120 percent, due to the effects of this flow biasing network.

F. Corrective Action

Normal scram recovery procedures were instituted, Group Isolations were reset, and the Diesel Generators were secured. Subsequently, upon discovery of an electrical problem with the motor for the 1B RHR Pump (which will be further explained in LER 88-003), a plant cooldown was initiated. As specified previously in Paragraph D, further maintenance efforts conducted following the scram, which included a thorough inspection of both RRMGs and calibration of the RRMG control loops, resulted in discovery of the problem with the 1B RRMG. The locking screw used to secure the disc, which had loosened and vibrated off, was re-installed along with a lock washer. Deficiencies found during calibration of the control loops were corrected. Further corrective

actions to be taken include upgrading preventive maintenance requirements associated with RRMG inspection and control loop calibration activities, incorporating the lessons learned from this event.

G. Prior Similar Events

No event of this nature has previously been reported.

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CNSS885592

February 26, 1988

U. S. Nuclear Regulatory Commission
Document Control Desk
Washington, D. C. 20555

Dear Sir:

Cooper Nuclear Station Licensee Event Report 88-002 is forwarded as an attachment to this letter.

Sincerely,
/s/ Guy Horn
G. R. Horn
Division Manager of
Nuclear Operations

GRH:sg

Attachment

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